California State Board of Equalization

450 N Street, Sacramento, California 95814

Indoor Air Quality/Odor Assessment June 2011 – January 2012 Draft Report

Project No. 2372.02-572



Prepared for:

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1.0 ODOR PROBLEM BACKGROUND

Facility historical records and discussions with occupants of the Board of Equalization (BOE) building at 450 N Street, Sacramento, California, have indicated the presence of musty odors of unknown origin on the 21st floor of the building. From December 11, 2009 through April 1, 2010, the 21st floor was turned over to the Department of General Services (DGS) Project Team as part of the building mold remediation project. During this period, multiple measures were taken to identify and eliminate any possible sources of the odors. An extended period of time (greater than that spent on other non-odor floors) was spent in ensuring the floor had been thoroughly investigated and remediated wherever warranted. In April 2010, the floor was returned to the BOE for re-occupancy.

During the ensuing year, complaints of odors appeared to be non-existent. However, in March 2011, the DGS-BOE Project Management Team was notified by BOE Management that on February 24th, odors were once more reported on the 21st floor. After a discussion between the floor occupants, Hygiene Technologies Inc. (HTI) and LaCroix Davis LLC (LCD), it was discovered that the floor occupants had begun experiencing the musty odors only a short time after re-occupying the floor in April 2010.

On March 4, 2011, Liz Houser, BOE Deputy Director Administration, met with representatives from DGS, HTI, and LCD to discuss the recent odor complaints. It was in Ms. Houser's meeting that an odor investigation of the 21st floor was initiated that would eventually include investigations of the indoor air quality (IAQ) in the core interstitial spaces of the building, the building heating, ventilation, and air conditioning (HVAC) systems, and floor coverings in the form of vinyl composite tiles (VCT). The HVAC and VCT related investigations and findings are discussed in separate summary reports. This report addresses the IAQ/odor assessment of the core interstitial spaces of the building.

2.0 BUILDING CORE IAQ/ODOR ASSESSMENT

The assessment was performed under the direction of Mr. Chris Corpuz, LCD Senior Project Manager. Mr. Theodore M. Ice, LCD Senior Associate, and other DGS and HTI personnel, conducted detailed inspections and collected various types of air samples to assess the reported IAQ/odor problem. Unable to identify any apparent sources of odor in areas that are normally accessible to building tenants or BPM personnel, the assessment was expanded to the building core interstitial spaces.

2.1 Building Core Sample Port Installation

In order to identify or eliminate the building core interstitial spaces as potential sources of odor, thirty-one (31) sampling ports were installed to access the main vertical shafts of the building (see Figures 1 and 2). The ports were designed to meet NFPA and California State Fire Marshall inspection scrutiny. The sampling ports were positioned above the hard ceiling in the restrooms or above suspended ceiling tiles in the hallways to allow the use of sample collection equipment without disturbing the normal tenant work spaces.



Fire-Rated Sampling Port

2.2 Spore Trap Samples

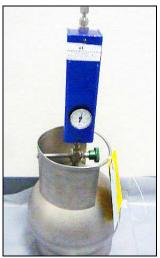
Visible mold growth (VMG) had been previously identified during limited destructive testing in some of the building core interstitial spaces. Therefore, on November 4, 2011, a total of thirty-four (34) spore trap samples were collected, one from each core interstitial space sampling port on Floors 2 and 21, and three (3) exterior background samples. The samples from Floor 2 served as background comparison samples for the samples collected on Floor 21. Each sample was collected at a sampling rate of 15 liters per minute for 5 minutes. The samples were submitted to EMLab P&K (EMLab) of West Sacramento under standard chain-of-custody. The laboratory reports are attached in Appendix A.



Spore Trap Sampling through Sampling Port

2.3 Volatile Organic Compound (VOC) Samples

On November 4, 2011, thirty-one (31) volatile organic compound (VOC) core samples were also collected from core interstitial spaces on Floors 2 and 21 for laboratory analysis. The core samples from Floor 2 served as background comparison samples. The air samples were collected in summa canisters (6 liters) for approximately eight hours and analyzed using the EPA Method TO-15 for potential VOC and tentatively identified compounds. LCD employed the services of Environmental Analytical Services, Inc. (EAS) in San Luis Obispo, California, for the VOC core sample analyses. EAS is accredited by the National Environmental Laboratory Accreditation Program (NELAP). The EAS laboratory reports are attached in Appendix B.



VOC Sample Collection via Summa® Canister

The thirty-one (31) core VOC samples were compared to the VOC samples collected during VCT removal activities between June 2011 and January 2012 from exterior and interior floor areas. The VCT VOC samples were utilized as background comparison for the November core interstitial space samples. They were analyzed by Air Toxics Ltd. in Folsom, California. Air Toxics Ltd. is accredited by the National Environmental Laboratory Accreditation Program (NELAP). The laboratory reports for these samples are included in the VCT Removal Reports and are not attached to this report.

2.4 Microbial VOC Samples

Microbial volatile organic compounds (MVOC) are composed of low molecular weight alcohols, aldehydes, amines, ketones, terpenes, aromatic and chlorinated hydrocarbons, and sulfur-based compounds, all of which are variations of carbon-based molecules. MVOC have a very low odor threshold, making them easily detectable by smell. They often have strong odors and are responsible for the odious smells (often described in terms such as old cheese, dirty socks, or locker room) associated with mold and bacterial growth.

EAS analyzed each of the thirty-one (31) VOC core samples collected on November 4, 2011, in order to determine if any of these samples contained VOC typically produced in situations where specific types of fungi or microbial organisms may be present.

3.0 RESULTS OF INVESTIGATION

3.1 Spore Trap Samples

In general, with the exception of three spore trap samples collected from the south-southwest core sample locations, all of the spore trap samples were unremarkable. In some samples, no airborne spores were detected. The spore trap samples collected from core sample locations 21-13, 21-14, and 21-16, showed elevated concentrations of *Penicillium/Aspergillus* (Pen/Asp) type spores. The laboratory reports and chain-of-custody forms from EMLab are provided in Appendix A.

3.2 VOC Samples

The VOC sample results are summarized in Table 1. The laboratory reports and chain-of-custody forms from Environmental Analytical Services, Inc. and Air Toxics Ltd. are provided in Appendix B.

The VOC results were compiled and compared to the following standards and guidelines:

- California Division of Occupational Safety and Health (DOSH) Permissible Exposure Limits (PEL)¹;
- California Environmental Protection Agency (Cal/EPA), Office of Environmental Health Hazard Assessment (OEHHA) Reference Exposure Levels (REL)²;
- Proposition 65 (Prop 65) Safe Harbor Levels³;
- Various odor thresholds compiled by the American Industrial Hygiene Association (AIHA)⁴ and Nagata⁵.
- 1. No VOC sample results exceeded the applicable California DOSH PELs (8-hour Time-Weighted Average). One VOC (naphthalene) was detected in two samples in levels that exceeded the Cal OEHHA chronic RELs (naphthalene chronic REL: 2 ppb; detected 3.09 ppb in sample #21-12 and 2.83 ppb in sample #21-13). Naphthalene's odor threshold is higher (AIHA minimum odor threshold: 9.5 ppb) than naphthalene concentrations detected in core samples #21-12 (3.09 ppb) and #21-13 (2.83 ppb). Naphthalene was, therefore, not found in detectable odor concentrations.

¹ California Division of Occupational Safety and Health (DOSH). "Table AC-1, Permissible Exposure Limits (PEL) for Chemical Contaminants." ONLINE. Available: http://www.dir.ca.gov/Title8/5155table_ac1.html [29 May 2012].

² California Environmental Protection Agency (Cal/EPA) Office of Environmental Health Hazard Assessment (OEHHA). 2012. "OEHHA Acute, 8-hour and Chronic Reference Exposure Levels (chRELs)." ONLINE. Available: http://oehha.ca.gov/air/allrels.html [29 May 2012].

³ California Environmental Protection Agency (Cal/EPA) Office of Environmental Health Hazard Assessment (OEHHA). "Proposition 65 Safe Harbor Levels, September 2011." ONLINE. Available: http://www.oehha.ca.gov/prop65/pdf/Sept2011Status.pdf [29 May 2012].

⁴ American Industrial Hygiene Association. 1989. "Odor Thresholds for Chemicals with Established Occupational Health Standards." AIHA: Akron, OH.

⁵ Nagata, Y. 2003. "Measurement of odor threshold by triangle odor bag method." *Odor Measurement Review*, Japan Ministry of the Environment 118-127.

- 2. Two VOC (isobutyl alcohol and toluene) were found in concentrations slightly above the AIHA's minimum odor thresholds of 12 ppb and 21 ppb for the two compounds, respectively.
 - Isobutyl alcohol was detected at 13.41 ppb in sample #2-10
 - Toluene was detected at 23.1 ppb in sample #2-9.
- 3. No other VOC were detected above either odor threshold criteria (AIHA or Nagata).
- 4. Several interior VOC concentrations were above the exterior ambient air sample concentrations. Some of the VOC detected indoors were not detected in the ambient exterior air. These concentrations are presented in the Table 1. However, all interior VOC concentrations were multiple orders of magnitude below the California occupational exposure limits (California DOSH PELs).
- 5. Nineteen (19) VOC that are listed on OEHHA's Prop 65 list were detected in the building. Thirteen (13) of those VOC may exceed the threshold requiring Cal Prop 65 notification, but these core samples were collected in locations inaccessible to personnel. Additional information on VOC concentrations in the building (collected historically) should be evaluated to determine the applicability of the Cal Prop 65 notification.

3.3 Microbial VOC Samples

When the 31 microbial VOC samples were analyzed by EPA Method TO-15 SIM Modified Microbial Volatile Organic Compounds (TIC), only two MVOC were detected: 3-octanol and 2-hexanone (as known as methyl n-butyl ketone).

The 3-octanol appears only in one sample drawn from the 21st floor. It is classified as a FDA Part 172 -- Food Additives Permitted for Direct Addition to Food for Human Consumption, Subpart F--Flavoring Agents and Related Substances, Sec. 172.515 Synthetic flavoring substances and adjuvants.

• Sample # 21-4; 3-octanol was detected at a concentration of 9.6 ppbv.

In the case of the 2-hexanone, it appeared in concentrations above the limits of detection in the method blank. Also, 2-hexanone was reported in concentrations above the limits of detection in the following samples:

- Sample #21-1; 2-hexanone at 9.6 ppbv
- Sample #21-1; 2-hexanone at 0.34 ppbv
- Sample #2-3; 2-hexanone at 0.3 ppbv
- Sample #2-4; 2-hexanone at 0.17 ppbv
- Sample #21-5; 2-hexanone at 0.18 ppbv
- Sample #21-9; 2-hexanone at 0.86 ppbv
- Sample #21-12; 2-hexanone at 0.26 ppbv
- Sample #21-13; 2-hexanone at 0.38 ppbv
- Sample #21-14; 2-hexanone at 0.24 ppbv
- Sample #21-15; 2-hexanone at 0.18 ppbv

- Sample #2-15; 2-hexanone at 0.27 ppbv
- Sample #21-16; 2-hexanone at 0.47 ppbv

2-hexanone has an odor threshold of 0.076 ppm (OSHA) and 24 ppb (Nagata), and because of its odor, 2-hexanone can be detected below the National Institute for Safety and Health (NIOSH) recommended exposure limit (REL); thus, 2-hexanone is treated as a chemical with adequate warning properties.

4.0 CONCLUSIONS AND RECOMMENDATIONS

- 1. In some spore trap samples, no airborne spores were detected. The spore trap samples collected from core sample locations 21-13, 21-14, and 21-16, showed elevated concentrations of *Penicillium/Aspergillus* (Pen/Asp) Type spores. However, VOC and microbial VOC detected at these same sample locations did not include 1-octen-3-ol (CAS 3394-86-4), which is an MVOC characteristic of Pen/Asp.
- 2. No VOC core building sampling results from November 4, 2011 exceeded the applicable California DOSH PELs.
- 3. All other interior core VOC concentrations were multiple orders of magnitude below the applicable occupational exposure limits (California DOSH PELs).
- 4. Two VOC (isobutyl alcohol and toluene) were found in core sample concentrations slightly above the AIHA's minimum odor thresholds of 12 ppb and 21 ppb for the two compounds, respectively.
- 5. No other VOC were detected above AIHA or Nagata odor threshold criteria.
- 6. Naphthalene's odor threshold is higher (AIHA minimum odor threshold: 9.5 ppb) than naphthalene concentrations detected in core samples #21-12 (3.09 ppb) and #21-13 (2.83 ppb). Naphthalene was, therefore, not found in detectable odor concentrations.
- 7. Several interior VOC concentrations were above the exterior ambient air sample concentrations. Some of the VOC detected indoors were not detected in the ambient exterior air.
- 8. Nineteen (19) VOC that are listed on OEHHA's Prop 65 list were detected in the building. Thirteen (13) of those VOC may exceed the threshold requiring Cal Prop 65 notification depending on duration of exposure and the location/access of the core samples. All of the core samples in this investigation were collected in locations inaccessible to personnel. Additional information/data on VOC concentrations in the building (collected historically) should be evaluated to determine the applicability of the Cal Prop 65 notification. The building already has a posted Prop 65 notification unrelated to this sampling event.
- 9. Only two (2) MVOC appear in the data: 2-hexanone and 3-octanol. In the case of the 2-hexanone, the compound also appears in the method blank and at a higher concentration than in the single sample it is detected in. The 3-octanol appears only in one sample drawn from

the 21st floor. It is classified as a FDA Part 172 -- Food Additives Permitted for Direct Addition to Food for Human Consumption, Subpart F--Flavoring Agents and Related Substances, Sec. 172.515 Synthetic flavoring substances and adjuvants.

- 10. DGS has elected to continue to monitor the indoor air quality (limited VOC and fungal genus and species) of the building tenant spaces until such time as results of air monitoring indicate conditions in the building require additional action on the part of the property management and owner.
- 11. The findings and recommendations of this report should be communicated to affected employees.

5.0 LIMITATIONS AND QUALIFICATIONS

The assessment performed by LCD does not include or cover the following matters: Matters that are subsequently discovered that could not have been reasonably foreseen or detected, using industry standards, during the performance of the assessment; matters that could not have been discovered by LCD because of barriers, lack of access or other matters affecting accessibility; matters that are not disclosed to LCD prior to, during, or after the performance of the assessment; and any new deficiency that may arise after the completion of the assessment by LCD.

To the extent that additional information becomes available to LCD, LCD reserves the right (without any obligation to do so) to modify its evaluation and/or this Report at any time, based upon further review and analysis of any such additional information or data.

Certain items mentioned in the Report were performed by others not involving the supervision of, or management by, LCD, but were relied upon by LCD in making its evaluation and assessment.

The assessment performed by LCD is not meant or intended to supplement, modify, or extinguish any warranty or representation made or given by third parties performing any of the recommended corrective work.

When consultation involves microbiological growth, or any assessment thereof, such microbiological growth may reoccur if the source of the growth is not remedied. All remediation of fungi in indoor environments can be inherently limited in the sense that conclusions are drawn and recommendations developed from information obtained from limited research and site evaluation. Except as may be noted in the assessment performed by LCD, subsurface areas, latent defects, or non-accessible areas and conditions were not field investigated and may differ from the conditions implied by the surface observations. Additionally, the passage of time may result in a change in the environmental characteristics at the subject property and the surrounding properties. No investigation or assessment can absolutely rule out the existence of any microbiological growth at any given site. LCD does not remediate or remedy sources of microbiological growth.

Draft Report – June 18, 2012 Indoor Air Quality/Odor Assessment LaCroix Davis LLC No. 2372.02-572

This Report and the assessment/survey conducted by LCD is prepared, and was performed, solely for the use and benefit of the client identified at the beginning of this Report. No other party may rely on this Report for any other purpose.

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FIGURES

Figure 1 Sample Port Locations – Floor 2

Figure 2 Sample Port Locations – Floor 21



LEGEND

(02-6) Sample Port Location

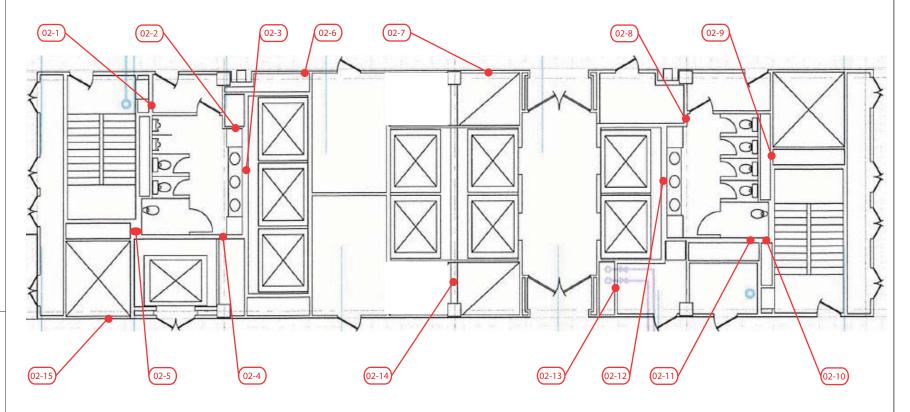
Sample Port Locations - Floor 2
Board of Equalization Building, IAQ/Odor Investigation
450 N Street, Sacramento, California

State of California
Department of General Services
(DGS No. 125828)
(AGMT. No. 3126150)
(LCD No. 2372.02-572)

Figure 1

Floor 2





Sample ports 1 - 5 are accessible through the men's bathroom ceiling access panel. Sample port 6 is accessible through the janitor closet ceiling access panel. Sample ports 8 - 12 are accessible through the women's bathroom ceiling access panel. Sample ports 7 and 13 - 15 are accessible by removal of ceiling tiles in corridor.



LEGEND

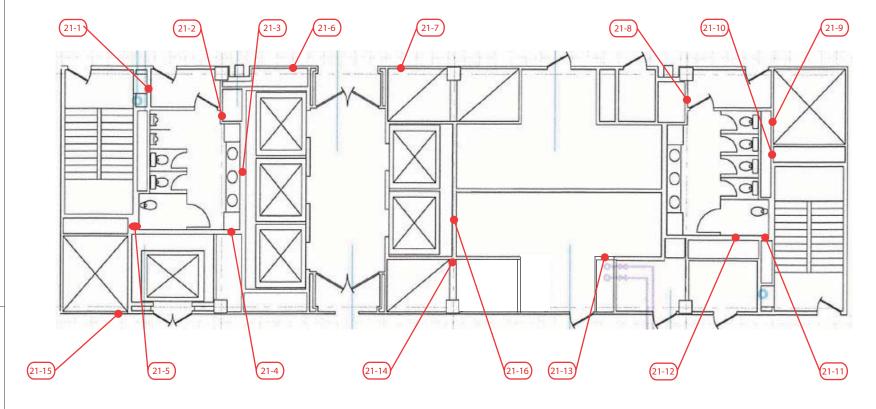
(21-6) Sample Port Location

Sample Port Locations - Floor 21
Board of Equalization Building, IAQ/Odor Investigation
450 N Street, Sacramento, California

State of California
Department of General Services
(DGS No. 125828)
(AGMT. No. 3126150)
(LCD No. 2372.02-572)

Figure 2

Floor 21 Image Not to Scale



Sample ports 1 - 5 are accessible through the men's bathroom ceiling access panel.

Sample ports 6, 7 and 15 are accessible by removal of ceiling tiles in corridor.

Sample ports 8 - 12 are accessible through the women's bathroom ceiling access panel.

Sample ports 13, 14 and 16 are accessible through the mailroom ceiling access panel.

TABLES

Table 1 VOC Sample Result Summary

Table 1: VOC Sample Result Summary



	OEL Level	OEL Level OEHHA Levels (ppb) (ppb unless noted otherwise)		Odor Threshold Levels												Co	re VOC Sam	ples Collecte		mber 4, 2011 fr Canister Numb	•	Ports - Results	in ppb										
CAS No. Compound	Cal OSHA PEL	Acute REL	8-hour REL	1	_	Nagata	AIHA (GM)	AIHA (Min)	AIHA (Max)		2-1 2: (350) (3	1-2 2- 306) (34	2-2 21 46) (31	-3 2-3 17) (933)	21-4 2- (320) (33	4 21-5 6) (378)	2-5 (323A)	21-6 (358)	2-6 2 (318) (3	21-7 2-7 379) (323)	21-8		9 2-9	21-10 2- (362) (93	10 21 37) (3	-11 2-1 83) (32	.1 21-12 7) (330)	2-12 (341)	21-13 2-13 (347) (935		2-14 21- (310) (34		21-16 (368)
VOC	1 000 000	Inia	INA	INIA.	NA.	Inia Ini		10	N/A	0.72	0.01	0.66															70 07	0.02	0.66) El	0.7	0.77	41 0.74
75-71-8 Dichlorodifluoromethane	1,000,000	INA	NA	NA	NA Yes	NA N	A I	NA I	NA	0.73	0.81	0.66		0.81	0.59	.67 0.6	L	0.69	0.49	0.54	0.68	0.62	.72	0.61	0.93	0.69 0	0.78 0.7	0.93	0.66	0.5	0.7	0.77 0.5	0.74
74-87-3 Chloromethane (Methyl Choride)	50,000		NA	NA	No level	NA			>10000	1.82	1.16	0.65	0.78	0.86	0.69	.91 0.7	0.41	0.87	8.1	0.56	1.24	1.23	.99	0.77	1.75	0.91 1	.95 0.79	1.47	1.17 0.	73	0.83 1	1.61 0.	.7 3.45
76-14-2 Freon 114 (1,2-Dichlorotetrafluoroethane) 106-99-0 1,3-Butadiene	1,000,000 1,000		NA NA	NA	NA 0.4	NA N.	A 1	NA 1	NA 76,000	0.52						.28											.33				-+	+	0.43
75-00-3 Chloroethane (Ethyl chloride)	100,000		NA	10,000	0 150				NA						`	.20			0.33														0.45
64-17-5 Ethanol (Ethyl alcohol)	1,000,000		NA	NA	NA	520	180,000		40,333,000			13.51		9.07		.35 7.2		4.84		0	1.22		.15 5.27					17.64	0.54	4.00		21.39 8.2	
75-69-4 Trichlorofluoromethane (Fluorocarbon 11) 67-64-1 Acetone (2-Propanone)	1,000,000 500,000		NA NA	NA NA	NA NA	NA N. 42,000	62,000	NA 1	NA 800,000	0.5 33.13		0.48 0 35.6 5		0.62 0.39 7.34 85.91	0.44 (23.3 37	.54 0.5	2 0.44 3 123.67	0.55 32.07		0.45 38.68 0.4	0.58 5.29		.51 0.54 .81 64.66			0.52 9.99 84	0.5 0.53 1.45 46.15	82.49	0.54 31.77 68.	1.08 99 0.54		0.4 0.3 32.17 33.4	
67-63-0 2-propanol (Isopropyl alcohol, isopropanol)	400,000	1,302.05		3,000		26,000	43,000	1,000	610,000		9.97		3.77	66.86	3.23	0.		8.89		9.06	1.38	2.74	8.67			9.98	5.69		7.15 7.			4.41 10.1	.3 6.38
75-65-0 t-Butanol (tert-Butyl alcohol)	100,000	NA	NA	NA	NA	4,500	960,000	3,300	957,000	1.29	1.06	0.59	4.45	1.7 4.53	1.67 (.58 0.4	5 1.47	1.03			1.06	1.31	1.9	0.51	0.5	3.6	0.38 2.95	2.98	2.17		2.66	0.81 0.5	9 132.01
4227-95-6 Methyl iodide (Methyl iodide CAS#74884)	2,000	NA	NA	NA	Yes No level	NA N	Α Α	NA I	NA										0.11											1.04			
75-35-4 1,1-Dichloroethene (Vinylidene chloride)	1,000		NA	20	0 NA	NA N		NA I	NA					0.58																			
107-13-1 Acrylonitrile	NA	NA	NA	2	2 0.7 Removed	8,800	1,600	1600	22,000																						-+	0.3	4
107-05-1 Allyl chloride	1,000	NA	NA	NA	from list	NA	none	480	5,900			1.34								2.95							0.57		0.67		0.81		
75-09-2 Dichloromethane (Methylene chloride)	25,000	4,029.90	0 NA	100		160,000	160,000	1200	440,000	0.51	1.21	0.52	0.8	0.4 1.25	1	.34 0.7	5 3.9		1.33	0.38			0.4 0.72	0.41	0.49	0.48	0.51	1.22		0.44	1.24	0.6 0.4	0.59
75-15-0 Carbon disulfide	1,000	1,990.94	4 NA	200	Yes 0 No level	210	nono	16	420						,	.59 1.3	9 1.03	0.4				0.73 1	.84				0.57	0.9				0.73	0.34
75-15-0 Carbon disulfide 107-12-0 Propionitrile	NA 1,000	1,590.94 NA	NA NA		NA NA	NA N	none A		420 NA							1.3	1.03	0.4			+	0.75	.04					0.9				0.73	
108-05-4 Vinyl acetate	10,000	NA	NA	50	0 NA	NA	120	110	400			0.27				.34 0.2							0.47				.35			0.27		0.66 0.	.5
78-93-3 2-Butanone (Methyl ethyl ketone)	200,000	4,408.46		NA 2.000	NA O NA	440	16,000	250	85,000					0.78 3.3		.15 3.9				1.33	0.92		.45 2.08				.85 2.05		3.12 0.			1.82 1.3	
110-54-3 Hexane (n-Hexane CAS# 110543) 141-78-6 Ethyl acetate	50,000 400,000		NA NA	2,000 NA	NA NA	1,500 870	none 18,000	65,000 170	248,000 190,000			1.95		1.6 4.45 2.2 9.19		.85 2.4				1.51 0.2 5.87	22 2.43		.12 3.72 2.2 11.11				1.75 1.51 3.94 1.96		1.92 5. 2.68	29 1.45 6.31		2.53 4.2 9.16 1.4	
109-99-9 Tetrahydrofuran (THF)	200,000		NA	NA	NA	NA	31,000	92	61,000			0.33		0.32		.53 0.8				0.37	3.88		.62	0.4			0.98 0.97		0.9	0.54		0.91 0.4	
78-83-1 Isobutyl alcohol (2-methylpropanol)	50,000		NA	NA	NA 10	NA	3,600	12	165,000			1.39												1	3.41								
67-66-3 Chloroform (Trichloromethane) 107-06-2 1,2-Dichloroethane (Ethylene dichloride)	2,000 1,000	30.72	2 NA NA	100		3,800 NA	192,000 26,000	4,300	1,413,000 680,000										2.7 0.41				_					+-+		+	-		+
110-82-7 Cyclohexane	300,000	NA	NA	NA 100	NA 10	2,500	780,000	520	784,000	0.49	0.57	0.71	0.65	2.82 0.69	1	.05 7.4	4 0.83	0.86		1.45 0.1	15 0.31	0.26	0.55	0.79	0.52	0.43).57	0.76	5.1	0.41	1.78	0.56 0.6	55 2.77
71-43-2 Benzene	1000	406.93		20		2,700	61,000	780	160,000		1.25		0.74	0.8		1.4 0.5			0.74	0.62 0.4	16 3.33		2.16		1.57		.22	2.26		0.71		1.08	6.78
540-84-1 2,2,4-Trimethylpentane	NA 400 000	NA	NA	NA NA	NA NA	670 N			NA 547.000	0.2			0.17	0.3		.18 0.1		0.25	0.0	0.21	2 0.02		.17 0.2		0.22		0.16		0.2	0.18		0.2	0.33
142-82-5 n-Heptane 78-87-5 1,2-Dichloropropane (Propylene dichloride)	400,000 75,000		NA NA	NA NA	NA 9.7	670 NA	230,000 260	40,000 260	547,000 520	0.46	1.37	0.31	1.25	0.42 3.87	0.25	.03 1.	3 1.14	0.35	0.8	0.49 0.3	0.83	0.23	.46 1.7	0.38	1.1	0.42	0.45	1.05	0.3	0.32	0.47	0.88 0.2	1.42
123-91-1 1,4 Dioxane (1,4-Diethylene dioxide; p-Dioxane)	280		0 NA	800	0 30	NA	12,000	800	172,000	6.54			(0.64 5.7			3.65						0.9						1.18		0.51		
75-27-4 Bromodichloromethane	NA	NA	NA	NA	5	NA N	1 A	NA I	NA										0.33														
80-62-6 Methyl methacrylate (methyl 2-methyl-2-propenoate)	50,000	NΑ	NA	NA	NA	NΑ	49	14	460								0.23																0.48
50 02 0 Meanly meaner frace (meanly 2 meanly 2 propendate)	30,000				Yes				100								0.23																0.10
108-10-1 4-Methyl-2-pentanone (Methyl isobutyl ketone)	50,000		NA	NA	No level	170	880	100	16,000		0.26		0.34	0.24		0.3 0.2							.33 0.33			0.24			0.29	0.22		0.29	
108-88-3 Toluene (toluol) 79-00-5 1,1,2-Trichloroethane (Vinyl trichloride)	10,000 10,000	9,819.28	NA NA	NA 70	0 7000	330 NA N	1,600	21 NA	69,000 NA	0.53	15.33			5.34 10.04 0.46	4.64 12	.43 9.5	9 11.04 0.92			7.11 3 0.44 0.3			.92 23.1 1.91		4.51 1.13	3.33	0.46	10.53 0.93	6.62 4. 0.44 0.			1.42	20.86
97-63-2 Ethyl methacrylate	NA 10,000	NA	NA	NA	NA NA	NA N			NA .	0.55		0.13	0.57	5.40		-	0.52	0.42	0.40	0.44 0.5	0.17	0.43	1.51			0.19	0.40	0.55	0.44 0.	0.5	0.51	1.42	1.04
					Yes																												
591-78-6 2-Hexanone (Methyl n-butyl ketone) 142-28-9 1,3-Dichloropropane	1000 NA	NA NΔ	NA NA	NA NA	No level NA	NA N	none I	68 NA	85 NA	0.34				0.3	(.17	0.18					C	.86				0.26		0.38	0.24		0.18 0.2	.7 0.47
111-65-9 Octane (n-octane)	300,000	NA	NA	NA	NA	1,700	150,000	15,000	235,000	2.98	2.62	2.67	2.28	3.22 4.93	0.89	.33 3.3	7 1.92	2.63	1.47	3.8 0.2	28 1.82	1.14 2	.94 2.81	2.97	2	4.65	0.52 3.75	3.1	2.89	2.57	1.74	0.92 0.8	9.19
121.02.1					Removed														0.00														
124-48-1 Dibromochloromethane 127-18-4 Tetrachloroethene	NA NA	NA NA	NA NA	NA NA	from list	NA N			NA NA										0.23												0.53		+
100-41-4 Ethylbenzene	100,000	NA	NA	400		170	none	92	600	0.43		-	0.36	7.36 0.33		0.7 0.3	0.91			0.32 0.3	32 0.31	C	.36 0.44		0.54	0.38	0.48 0.62		0.39			0.28	+
1330-20-7 m, p-Xylenes (xylol; dimethylbenzene)*	100,000	5,066.40		_	0 NA	41	620	81				0.55		3.76 1.19		.72 1.1	_			0.91 2.0			1.6 1.82				.47 2.87		1.12	0.75		1.07 0.5	
111-84-2 Nonane (n-Nonane) 100-42-5 Styrene (Phenylethylene)	200,000 50,000	NA 4,930.38	NA O NIA		NA 0 NA	2,200 35	none 140	1,000 4.7	21,000 61,000		0.59			32.7 0.69 0.42 0.54	0.67		7 0.56 1 0.54			0.87 0.1	14 0.63		0.7 0.92 0.47			1.09 1 0.61	0.55		0.8	0.45	0.18 C	0.55	0.9
75-25-2 Bromoform (Tribromomethane)	50,000		NA NA	NA 200	64	NA 35	none	190			0.40		0.00	U.34		.+0 0.4	0.54		0.31	0.43	1		0.47	0.52	0.33	0.01	0.55		0.0	0.38	0.00 (J.44	0.59
95-47-6 o-Xylene	NA	5,066.40	0 NA		0 NA	380	5,400	180	5,400			(0.46	8.7 0.55	0.34	.46 0.3	7 0.78			0.31 0	.6 0.45	С	.49 0.55				0.5 1.1		0.38			0.4	0.47
95-49-8 2-Chlorotoluene (o-Chlorotoluene, Benzyl Chloride) 106-43-4 4-Chlorotoluene	50,000	NA NA	NA NA		NA NA	NA NA	41	41	46 NA					1 72		25					-		-	0.21		0.22	0.45	\vdash			$-\!\!\!\!+\!\!\!\!\!-$		+
106-43-4 4-Chlorotoluene 103-65-1 n-Propylbenzene	NA NA	NA NA	NA NA	NA NA	NA NA	NA N. 3.8 N.			NA NA		-	+		0.72 3.72		.25			-		+		+				0.17		+		-+	-	+
					Yes																												
98-82-8 Isopropyl benzene (Cumene) 622-96-8 4-Ethyltoluene (p-Ethyltoluene; ethylmethyl-benzen)	50,000	NA	NA	NA	No level	8.4	32	5.1	1,300					2.92 0.4			0.26			0.29 0			.33 0.55			0.42			0.3			0.29 0.2	
622-96-8 4-Ethyltoluene (p-Ethyltoluene; ethylmethyl-benzen) 108-67-8 1,3,5-Trimethylbenzene	NA NA	NA NA	NA NA	NA NA	NA NA	8.3 N. 170	2,200	NA I	NA 2,200	0.43		0.19		2.37 0.17 2.06		.94 0.3	1 0.17	0.31		0.24 0.1	נא	0.78	.54 0.45	0.35	U.25	0.39	0.75		0.62	0.21	0.44	0.2 0.2	0.33
124-18-5 Decane (n-Decane)	NA	NA	NA	NA	NA	620 N	I A	NA I	NA		2.53	0.83	4.46 20	5.15 3.02			1 1.69	3.1	1.99	3.05	3.92	0.55 5	.93 3.42	3.67	3.96	9.2 2	84 4.6	3.25	2.81 0.	21 2.74	2.96	0.96 1.	.9 3.09
98-06-6 tert-butyl benzene	NA	NA	NA	NA	NA	NA N.			NA 2 400	0.55				0.88	0.34	27					17		20 2 -	0.30	0.26	0.20	0.35		0.30	\perp		0.30	+
95-63-6 1,2,4-Trimethylbenzene 538-93-2 i-Butyl benzene	NA NA	NA NA	NA NA	NA NA	NA NA	120 NA N.	2,400 A	NA I	2,400 NA	0.46		-		5.07 0.29 0.42	0.34 2	.3/	0.28			0.4	+/		.39 0.5	0.38	U.36	U.38	2.21	+	0.38	+	——	0.28	+
135-98-8 sec-butyl benzene	NA	NA	NA	NA	NA NA	NA N			NA NA					1.24			L				1											<u>_</u> _	<u> </u>
99-87-6 Isopropyltoluene	NA	NA	NA	NA	NA	NA N			NA					0.85			1 1.92					С	.22			0.21	0.22		0.24				
104-51-8 n-Butylbenzene 120-82-1 1,2,4-Trichlorobenzene	NA 5,000	NA	NA NA	NA NA	NA NA	8.5 N.	A I	NA 1	NA 2,960	2.51			- :	1.11		0.4							_				0.38	+-+		+	-		+
91-20-3 Naphthalene	10,000		NA	IVA	2 5.8		none 38	9.5			_	0.24			1	.35					+						3.09		2.83	0.64	0.26	+-	+
MVOC										,					-	÷																	
Pentanones			+							2.5											-		-				4.7	\vdash	2.1	4.0	4.7		+-
Heptanones Octenols			+		+	 				2.5		-				9.6					-		+		_		1.9	+	2.1	1.3	1.7	+	+
Octanones			<u> </u>														L				1						1.3		3.9			<u>_</u> _	1
SIM ANALYTICAL REPORT (MVOC)	,	ı	_			<u> </u>				n .					<u> </u>							-		<u> </u>			· ·	<u> </u>					
110-00-9 Furan (Furane)	NA.	NA	NA	NA	Yes No level	9900 N	, .	NA I	NA																								
930-27-8 3-Methylfuran	NA NA	NA	NA NA	NA NA	No level NA	9900 N.			NA NA			+									1		_					+ +			-+	_	+
110-43-0 2-Heptanone (Methyl n-amyl ketone)	50000	NA	NA	NA	NA	6.8	none	180	190	2.5																			2.1	1.3	1.7		
589-98-0 3-Octanol	NA	NA	NA	NA	NA	NA N			NA F 000						9.6											\bot		$\perp T$	2.0	\perp			+
106-68-3 3-Octanone (Ethyl Amyl Ketone)	NA	NA	NA	NA	NA	NA	none	5900	5,900					IFIDENTIAL			1	<u> </u>									1		3.9			inted 6/18/2	



Table 1: VOC Sample Result Summary

		051		11A II											l. 7 "	and do to come			Fl.			Dr. 1. 1					
		OEL Level (ppb)		HA Levels noted otherwise)		Odor Thre	reshold Levels		Additional VOC Samples Collected during VCT Removal at Various Indoor Floor Areas and Exterior Areas - Results in ppb (Sample Date Preceeds Sample Number, Exterior Samples in Italics)																		
CAS No.	Compound	Cal OSHA	8-hour			AIHA		AIHA	1/13/12 1	/9/12 12/	/2/11	12/2/11 12/2/11 11/2	25/11	11/18/11 10		-					11/5/11	6/17/11	6/17/11	10/22/11	11/25/11	11/18/11	1 11/4/1
		PEL	Acute REL REL			(GM)	AIHA (Min)	(Max)				F5V04 F6V01 F7													EXTV06		
voc																											
75-71-8 D	Dichlorodifluoromethane	1,000,000	NA NA	NA NA Yes	NA N	NA	NA N	NA									-	<u> </u>									
74-87-3 C	hloromethane (Methyl Choride)	50,000	NA NA	NA No level	I NA	none	>10000 >:	>10000										'	ļ.	1		ļ	i	1			
	reon 114 (1,2-Dichlorotetrafluoroethane)	1,000,000		NA NA				NA											<u> </u>	\blacksquare			 				
	,3-Butadiene :hloroethane (Ethyl chloride)	1,000 100,000		8 0. 10,000 15				76,000 NA	1		-							 	1				-				
	thanol (Ethyl alcohol)	1,000,000		NA NA	520				27	9	11	6.2 11	13	6.8	24	26 7	7 10) 15	5 19	22	8.8	3 15		6.4	7.7	NA	NA
	richlorofluoromethane (Fluorocarbon 11)	1,000,000		NA NA				NA		0.68	0.86	0.98											i				
	cetone (2-Propanone)	500,000		NA NA	42,000			800,000	33		4.7	3.5 17	3.6	21	12	8.3 5.2					5.9		6.9	6.8			
	-propanol (Isopropyl alcohol, isopropanol) -Butanol (tert-Butyl alcohol)	400,000 100,000	1,302.05 NA NA NA	3,000 NA NA NA	26,000 4,500	43,000 960,000		610,000 957,000	65	54	-	7.1	9.8	20	34	5.3 83	5.8	3 190	\vdash	18	22	11			96		+
73 03 0 1	Butanor (terr butyr deconory	100,000		Yes	4,500	300,000	3,300	337,000					\rightarrow				 	+	+	$\overline{}$		+ + +	i		+		
	Nethyl iodide (Methyl iodide CAS#74884)	2,000		NA No level			NA N											1	ļ.				ı				
	,1-Dichloroethene (Vinylidene chloride)	1,000		20 NA				NA an ana												\longrightarrow			 				
107-13-1 A	crylonitrile	NA	NA NA	Removed	0.7 8,800 d	1,600	0 1600	22,000	1		-						+	+		\vdash		+					
107-05-1 A	allyl chloride	1,000	NA NA	NA from list		none	480	5,900	,									,	ļ	1		ļ	i	i	Į.		
75-09-2 D	ichloromethane (Methylene chloride)	25,000	4,029.90 NA	100 20	00 160,000	160,000	0 1200	440,000															i				
75.45.0	tank an alteretisk	4 000	4 000 04 14	Yes	240		4.5	427										,	ļ	1		ļ	i	i	Į.		
75-15-0 C 107-12-0 P	arbon disulfide	1,000 NA	1,990.94 NA NA NA	NA NA			NA N	420 NA	+-+	-+	-+		-+		-+		+	 	+	$\overline{}$		+	\longrightarrow				+
107-12-0 P		10,000		50 NA	NA NA	120		400		-+	-		-+		-+		\vdash	 	+	$\overline{}$		+	- 		+		+
78-93-3 2-	-Butanone (Methyl ethyl ketone)	200,000	4,408.46 NA	NA NA	440		0 250	85,000																			
	lexane (n-Hexane CAS# 110543)	50,000		2,000 NA	1,500	none	65,000	248,000	14	1.3	1.3	5	F	5.6	1.4		10	2.4	↓	12		<u> </u>	T		 		4
141-78-6 Et	thyl acetate etrahydrofuran (THF)	400,000 200,000		NA NA	870 NA	18,000 31,000		190,000 61,000	 		-		\rightarrow		\longrightarrow			+'	\vdash			+			1		+
	sobutyl alcohol (2-methylpropanol)	50,000		NA NA	NA	3,600		165,000	\vdash	-+	-+		-+	-+	-+		+		\vdash	-		+					+
67-66-3 C	hloroform (Trichloromethane)	2,000	30.72 NA	50 4	40 3,800	192,000	0 600	1,413,000																			
	,2-Dichloroethane (Ethylene dichloride)	1,000		100 1	.0 NA	26,000		680,000	$oxed{\bot}$	_	\bot		\bot T	-	$-\bot$		\bot	 	\perp	\vdash		$\perp \perp \perp $	\Box		 		4
	cyclohexane	300,000 1000	NA NA	NA NA 20 1	2,500	780,000		784,000			-		\rightarrow										_				
	enzene ,2,4-Trimethylpentane	1000 NA	406.93 NA NA NA	NA NA	13 2,700 670 N	61,000 NA	NA N	160,000 NA		-+	-+		-+		-+		+	+	+	$\overline{}$		+			+		+
	-Heptane	400,000		NA NA	670			547,000							+			L	Ħ								<u> </u>
	,2-Dichloropropane (Propylene dichloride)	75,000).7 NA	260		520					\Box				<u> </u>	$\perp = $	1	\Box					1		
	,4 Dioxane (1,4-Diethylene dioxide; p-Dioxane)	280	800 NA	000 -	30 NA	12,000		172,000	+-+	-+			\rightarrow	-	-+			 				+	\longrightarrow		1		+
75-27-4 B	romodichloromethane	NA	NA NA	NA	JIVA N	NA	NA N	NA	+-+	-+			-+		-+		\vdash	+	+	$\overline{}$		+			+		+
80-62-6 N	Nethyl methacrylate (methyl 2-methyl-2-propenoate)	50,000	NA NA	NA NA	NA	49	9 14	460	,									1 '		,			, l	1			
				Yes																			1				
	-Methyl-2-pentanone (Methyl isobutyl ketone)	50,000		NA No level		880		16,000					0.01					<u></u> '					-				
	oluene (toluol) ,1,2-Trichloroethane (Vinyl trichloride)	10,000 10,000	9,819.28 NA NA NA	70 700 NA 1			0 21 NA N	69,000	1				0.81				+	+		$\overline{}$		+					
	thyl methacrylate	NA	NA NA	NA NA				NA.					\rightarrow					+	+	$\overline{}$		+ + +	i		+		
				Yes		-		-															1				
	-Hexanone (Methyl n-butyl ketone)	1000		NA No level			68	85										<u> </u>					-		ļ		
	,3-Dichloropropane Octane (n-octane)	NA 300,000	NA NA	NA NA	1,700			NA 235,000			-							 									
111 03 3 0	octane (ii octane)	300,000		Removed		130,000	13,000	233,000					\rightarrow					+	+	$\overline{}$		+ + +	i		+		
	Dibromochloromethane	NA	NA NA	NA from list			NA N	., .										1	ļ.				ı				
		NA 100.000	NA NA	NA NA			NA N											<u> </u>		\longrightarrow		1	-		ļ		
100-41-4 Et	thylbenzene n, p-Xylenes (xylol; dimethylbenzene)*	100,000 100.000		400 5 200 NA	54 170 41		92	600 550		*D	le to ver	riances in Xvlene thresho	old grow	nings across a	gencies m	-Xvlene which had	ower thread	nolds has h	een used fo	r m- and n V	(vlener	+	\vdash		1		
	Ionane (n-Nonane)	200,000	-,	NA NA	2,200		1,000	21,000	+	Due	- to vall	cs iii Ayielle tillesll0	.a group	153 act USS di	Sericics, III-	v, circ, willell lids IC	ci uitesti	Jius, Has De	Lan useu IUI	and p-X	1,01103	+	- 		+		+
100-42-5 St	tyrene (Phenylethylene)	50,000	4,930.38 NA	200 NA	35	140	0 4.7	61,000																			
	romoform (Tribromomethane)	500			64 NA	none	190	15,000							$-\bot$				\perp	↓		\perp	,		↓		4
95-47-6 o	Xylene Chlorotoluene (o-Chlorotoluene, Benzyl Chloride)	NA 50,000	5,066.40 NA NA NA	NA NA	380 NA	5,400 41		5,400	-		-		\rightarrow		-+		+		+	\vdash		+	$\overline{}$				+
		50,000 NA	NA NA	NA NA	NA N			VA	+	-+	-+		-+	-+	-+		+		+	-		+	-				+
		NA	NA NA	NA NA	3.8 N			NA																			
00.07			d	Yes		-			1 T				T		T		1				-		, 7				
	sopropyl benzene (Cumene) -Ethyltoluene (p-Ethyltoluene; ethylmethyl-benzen)	50,000 NA	NA NA	NA No level	8.4 8.3 N		2 5.1 NA N	1,300	+-+		-+		\rightarrow		-+		+	+	 	\longrightarrow		+			1		+
			NA NA	NA NA	170			NA 2,200	\vdash	-+	-+		-+	-+	-+		+		\vdash	-		+					+
124-18-5 D	Decane (n-Decane)	NA	NA NA	NA NA	620 N	NA	NA N	NA																			
	,		NA NA	NA NA				NA 2.400			\blacksquare		\bot		\bot				\perp	\vdash			\Box				
	•		NA NA	NA NA	120 NA N			2,400 NA	+-+		-+		\rightarrow		-+			 	1	\vdash		+			1		+
	•		NA NA	NA NA				NA NA		-+	-+		-+		-+		+	+	+	$\overline{}$		+			+		+
			NA NA	NA NA				NA AV				<u> </u>						L									1
104-51-8 n	-Butylbenzene	NA	NA NA	NA NA	8.5 N			NA									1	1		\vdash			,		 		
120-82-1 1, 91-20-3 N	,2,4-Trichlorobenzene	5,000 10,000		NA NA	NA i.8 NA	none 38	2,960 8 9.5	2,960 640		-+			\rightarrow		-+			 	1	\vdash		+			1		+
MVOC	apricialene	10,000	NA NA	2 5.	Olivo	38	9.5	040																			
P	entanones																										
	leptanones				\bot				oxdot				\Box		\bot		$\perp =$	$\perp =$	_	\vdash					_		
	Octanopes			+	+		++		+-+	-			\rightarrow		-+			 '				+			1		+
	Octanones FICAL REPORT (MVOC)										_		_														
J AHALI				Yes							$\overline{}$		$\overline{}$														
	()	NA	NA NA	NA No level				NA										<u> </u>				<u> </u>	L				
1-			NA NA	NA NA				NA	\bot	$ \top$				-	$ \top$		$\perp =$	+ =	\perp	\vdash		$\perp \Box$	\Box		 		4
		50000	NA NA	NA NA	6.8	none	180	190	4			1 1			1		1	1	1	1		1			1		
110-43-0 2-	-Heptanone (Methyl n-amyl ketone)			NIA PIA	NIA	MA	NIA	1.6			-			+	-				_	+			1		+		
110-43-0 2- 589-98-0 3-	-Octanol		NA NA	NA NA	NA N NA	NA none	NA N 5900	NA 5,900		=	-				_										+		